Development of a Production-Feasible, Common Rail Fuel Injection System for Liquid Dimethyl Ether (DME) for Use in Heavy-Duty Vehicles

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Subcontract Number

ACI-5-15107-02

Performance Period

10/95–5/97

NREL Subcontract Administrator

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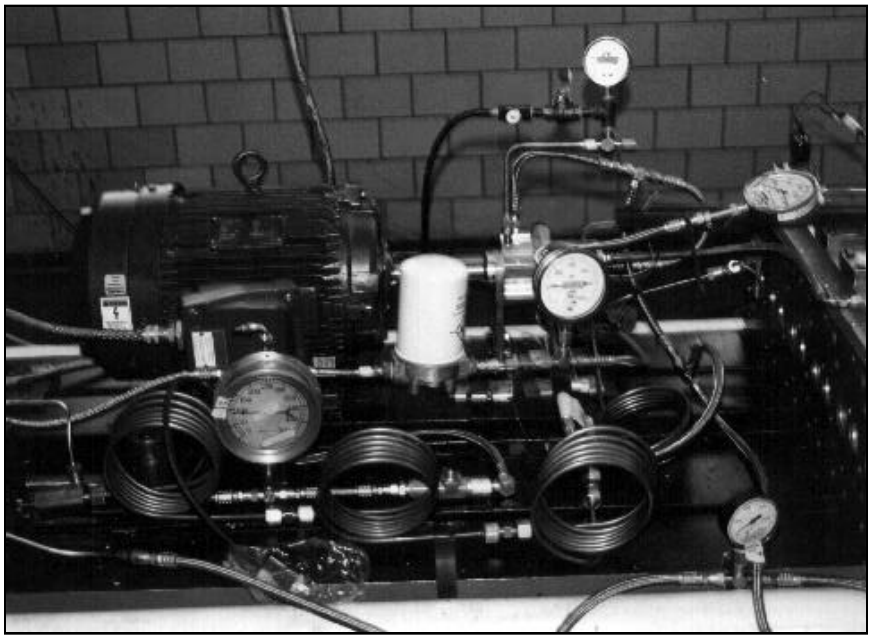
Objectives

To develop a production-feasible, common rail fuel injection system for DME for use on heavy-duty vehicles; and to demonstrate diesel equivalent energy efficiency at emissions levels well below all proposed regulations. Program emissions goals are: 1.5 g/bhp-hr NO_x ; 0.05 g/bhp-hr particulates.

Approach

AVL Powertrain Engineering will design, simulate and produce a novel, common rail fuel injection system for DME that features electronically tunable "rate shaping". Their design will incorporate many existing production components, including an axial piston fuel supply pump, 17 mm nozzles and high performance solenoid valves. The system will be bench tested and optimized, and then installed on a Navistar DTA 530 engine for development and emissions demonstration.



DME fuel system bench test

Accomplishments

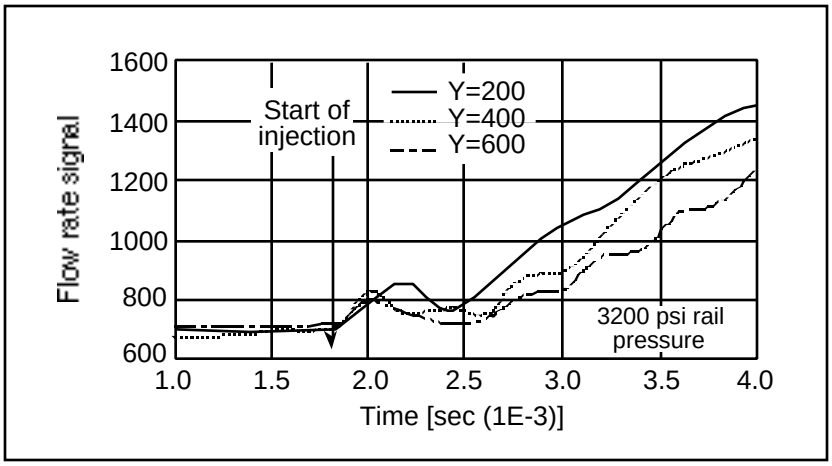
- The fuel injection system design and simulation work has been completed. Computer results showed that the system will perform up to expectations.
- Experimental parts have been procured, bench tested and optimized. Test results verify the computer simulations. System performance meets the program goals, and the unique "rate shaping" feature has been success fully demonstrated.
- Phase II (engine emissions demonstration) of the program is underway. Engine testing should begin in December.

Future Direction

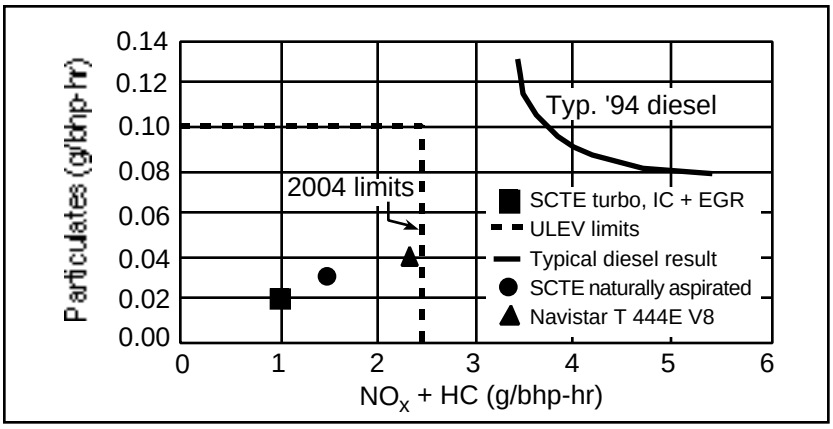
Following successful injection system development and emissions demonstration, a field test demonstration in heavy-duty trucks will be undertaken. Details of this field test are not yet finalized.

Publications

None to date.



Bench test-results—injection rate flexibility. Effect of "Y" on initial injection rate



DME exhaust emissions